

## CLAIMS

At least the following is claimed:

- 1    1.    A method of producing a structure, comprising the steps of:  
2                providing an alginate-based powder;  
3                providing at least one binder;  
4                dispensing the alginate-based powder and the binder onto a build  
5 platform to form a layer of an alginate-based material; and  
6                forming a flexible three-dimensional object from the alginate-based  
7 material on the build platform.
  
- 1    2.    The method of claim 1, wherein the alginate-based powder includes at least  
2 one alginate compound and at least one component selected from at least one  
3 filler and at least one multivalent cation.
  
- 1    3.    The method of claim 2, further comprising:  
2                dispensing the alginate-based powder and the binder onto the build  
3 platform independently, wherein the alginate-based powder and the binder on  
4 the build platform are commingled to form the layer of the alginate-based  
5 material.
  
- 1    4.    The method of claim 2, wherein dispensing includes:  
2                dispensing a layer of the alginate-based powder; and  
3                dispensing a layer of the binder onto the layer of the alginate based  
4 powder thereby forming the layer of the alginate-based material.
  
- 1    5.    The method of claim 2, wherein dispensing the alginate based powder and the  
2 binder is performed sequentially.
  
- 1    6.    The method of claim 2, wherein the binder includes a water retaining additive.

- 1     7.     The method of claim 2, wherein the alginate compound is selected from  
2            alginic acid and derivatives thereof, sodium alginate and derivatives thereof,  
3            potassium alginate and derivatives thereof, magnesium alginate and  
4            derivatives thereof, calcium alginate and derivatives thereof, and combinations  
5            thereof.
- 1     8.     The method of claim 1, wherein the binder is an alginate swelling agent.
- 1     9.     The method of claim 2, wherein the alginate-based powder includes  
2            components selected from a retardant, a wetting agent, a viscosity modifier, a  
3            surface tension modifier, a colorant, water retaining additives, fibers, and  
4            combinations thereof.
- 1     10.    The method of claim 1, wherein the binder includes components selected from  
2            a retardant, a wetting agent, a viscosity modifier, a surface tension modifier,  
3            fibers, a colorant, water retaining additives, and combinations thereof.
- 1     11.    The method of claim 1, wherein the alginate-based powder is from about 20%  
2            to 90% by weight of the alginate-based material and the binder is from about  
3            10% to 80% by weight of the alginate-based material.
- 1     12.    The method of claim 2, wherein the alginate compound is from about 10% to  
2            95% by weight of the alginate-based powder, the filler is from about 5 to 90%  
3            by weight of the alginate-based powder, and the multivalent cation is from  
4            about 0.01% to 50% by weight of the alginate-based powder.
- 1     13.    A structure, comprising the flexible three-dimensional object produced by the  
2            method of claim 1.

- 1 14. A solid freeform fabrication system for producing a three-dimensional object,  
2 comprising:  
3 a dispensing system including an alginate-based material that includes  
4 an alginate-based powder and a binder, wherein the dispensing system is  
5 adapted to dispense the alginate-based material.
- 1 15. The solid freeform fabrication system of claim 14, wherein the dispensing  
2 system includes at least one ink-jet printhead.
- 1 16. The solid freeform fabrication system of claim 14, wherein a first ink-jet  
2 printhead includes the binder.
- 1 17. The solid freeform fabrication system of claim 14, wherein a second ink-jet  
2 printhead comprises a slurry including the alginate-based powder.
- 1 18. The solid freeform fabrication system of claim 14, wherein the dispensing  
2 system includes a powder spreading system.
- 1 19. The solid freeform fabrication system of claim 14, further comprising:  
2 a computer control system operative to control the dispensing system.
- 1 20. The solid freeform fabrication system of claim 14, further comprising:  
2 a computer aided design system.